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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/666,331	09/17/2003	Hong Shih	LMRX-P023/P1130	8374
32986 IPSG, P.C. P.O. BOX 700640 SAN JOSE, CA 95170	7590 10/23/2007		EXAMINER BLAN, NICOLE R	
			ART UNIT 1792	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/666,331

Applicant(s)

SHIH ET AL.

Examiner

Nicole Blan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 02 October 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-33,38-44 and 46-54 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-33,38-44 and 46-54 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_

### DETAILED ACTION

1. The Examiner acknowledges the amendments to claims 1-2 and 4. Claims 1-2, 4-33, 38-44, and 46-54 are currently examined on the merits.

#### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1-2, 4-7, 9-33, 38-39, 44, and 46-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shih et al. (U.S. PGPub 2003/0190870, hereafter '870), in view of Han et al. (U.S. PGPub 2003/0127049, hereafter '049), and further in view of Crevasse et al. (U.S. PGPub 2002/0139393, hereafter '393).

Claim 1: '870 teaches cleaning ceramic surfaces of parts used in semiconductor processing equipment [abstract] by exposing a set of structures in a first solution including an oxidizer for a first period [H<sub>2</sub>O<sub>2</sub>; page 2, paragraph 15; page 5, paragraph 32], removing the set of structures from the first solution [going from one solution to the next; page 5, paragraph 32],

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exposing the set of structures to a second solution including a ketone reagent for a second period [acetone; page 5, paragraph 32], removing the set of structures from the second solution [going from one solution to the next; page 5, paragraph 33], and treating the structures with a third solution including a first set of acids for a third period [HF; page 2, paragraph 16; page 5, paragraph 33]. '870 does not explicitly disclose the time in which the structures are in contact with the third solution, but it does teach on page 2, paragraph 16, lines 10-12 that the length of time the structures are left in contact with the solution may be determined routinely by one of ordinary skill in the art without undue experimentation. It would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the time the solution remained in contact with the structures, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

In addition, '870 does not specifically indicate that ceramic surfaces include yttrium oxide, as recited in the preamble of the instant claim 1. However, a preamble is generally not given any patentable weight where it merely recites the purpose of a process, and where the body of the claim does not depend on the preamble for completeness, but instead, the process steps or structural limitations are able to stand alone. *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976). It is noted that chamber parts are conventionally covered with ceramic coating of yttrium oxide in order to better protect the chamber parts from corrosion, as evidenced by '049 [col. 1, lines 35-40; col. 4, lines 43-50]. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the yttrium oxide coated ceramic parts taught by

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'049 as the parts to be cleaned by '870 with a reasonable expectation of success because '049 teaches that yttrium oxide coating protects the parts from corrosion.

'870 and '049 remain silent with respect to mechanically rubbing a surface of the part while treating it with a first set of acids. However, scrubbing or wiping or rubbing surfaces during wet cleaning is conventionally utilized in the art, as indicated by '393, who teaches cleaning the surfaces of substrates with a brush [i.e. scrubbing] [page 1, paragraphs 4-5]. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the cleaning techniques taught by '393 in combination with the solutions taught by '870 with a reasonable expectation of success because '393 teaches that brushes are an effective way to remove any residual debris on the substrate.

As discussed above, the time the structures remain in contact with the cleaning solution is a result effective variable. It is common knowledge that brushing a structure while using a cleaning solution decreases the time required to clean the object. It would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the cleaning time of brushing the structures with the cleaning solution, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Claim 2: '870, '049, and '393 teach the limitations of claim 1 above. '870 teaches exposing the structures to a fourth solution including a second set of acids for a fourth period [HCl; page 2, paragraph 16; page 5, paragraph 33]. '870 does not explicitly disclose the time in which the structures are in contact with the fourth solution, but it does teach on page 2,

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paragraph 16, lines 10-12 that the length of time the structures are left in contact with the solution may be determined routinely by one of ordinary skill in the art without undue experimentation. It would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the time the solution remained in contact with the structures, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). '870 also teaches exposing structures to a fifth solution including a first set of alkalines for a fifth period [NH<sub>4</sub>OH; page 2, paragraph 15]. They indicate that treatment with NH<sub>4</sub>OH may be useful in removing metal contaminants [page 2, paragraph 15], as well as indicate that chemical steps in this cleaning routine may further include or be replaced with the other chemical steps depending on the nature of contaminants to be removed [pages 4-5, paragraph 31].

Claim 4: '870, '049, and '393 teach the limitations of claim 1 above. '870 teaches that the first set of acids includes HF, HNO<sub>3</sub>, and H<sub>2</sub>O [page 2, paragraph 16; page 5, paragraph 33].

Claims 5-6 and 9-20: '870, '049, and '393 teach the limitations of claims 2 and 4 above. '870 teaches rinsing parts with DI water and drying with filtered nitrogen upon cleaning with particular chemicals is know to those of ordinary skill in the art [Figs. 2-3; page 5, paragraph 34, lines 22-29].

Claim 7: '870, '049, and '393 teach the limitations of claim 2 above. '870 discloses that ultrasonically enhanced cleaning/rinsing is conventional in the art and one skilled in the art would have found it obvious to enhance the cleaning of the parts by applying ultrasonic waves to the acetone containing solution of '870 [page 5, paragraph 34, lines 11-13].

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Claims 21-22: '870, '049, and '393 teach the limitations of claim 2 above. '870 teaches that the first solution contains an oxidizer [ $\text{H}_2\text{O}_2$ , page 2, paragraph 15; page 5, paragraph 32].

Claims 23-25: '870, '049, and '393 teach the limitations of claim 22 above. '870 teaches that  $\text{H}_2\text{O}_2$  comprises about 30% of the solution [page 5, paragraph 32, lines 13-20].

Claims 26, 28, 44, and 54: '870, '049, and '393 teach the limitations of claim 2 above. '870 does not explicitly disclose the time in which the structures are in contact with the first, second, fourth, or fifth solution, but it does teach on page 2, paragraph 15, lines 17-20 that the length of time the structures are left in contact with the solution may be determined routinely by one of ordinary skill in the art without undue experimentation. It would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the time the solution remained in contact with the structures, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Claim 27: '870, '049, and '393 teach the limitations of claim 2 above. '870 teaches that the ketone reagent comprises acetone [page 5, paragraph 32].

Claim 29: '870, '049, and '393 teach the limitations of claim 2 above. '870 teaches the use of acidic solution in combination with  $\text{H}_2\text{O}_2$  [pages 4-5, paragraphs 31 and 33] and that the processing steps can be replaced. Therefore, the presence of  $\text{H}_2\text{O}_2$  in the first set of acids or in the third cleaning solution, as recited, is expected within the teaching of '870.

Claim 30: '870, '049, and '393 teach the limitations of claim 2 above. '870 teaches that the first set of acids comprises HF [page 2, paragraph 16; page 5, paragraph 33].

Claims 31-33: '870, '049, and '393 teach the limitations of claim 30 above. '870 does not explicitly disclose the concentration of the first set of acids in the third solution, but it does teach on page 2, paragraph 16 that the relative amounts of HF may be determined routinely by one of ordinary skill in the art without undue experimentation. It would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the concentration of the solution, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Claim 38: '870, '049, and '393 teach the limitations of claim 2 above. '870 does not explicitly disclose the time in which the structures are in contact with the third solution, but it does teach on page 2, paragraph 16, lines 10-12 that the length of time the structures are left in contact with the solution may be determined routinely by one of ordinary skill in the art without undue experimentation. It would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the time the solution remained in contact with the structures, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Claim 39: '870, '049, and '393 teach the limitations of claim 2 above. '870 teaches that the third solution comprises H<sub>2</sub>O [page 2, paragraph 16, lines 1-4].

Claims 46-49: '870, '049, and '393 teach the limitations of claim 2 above. '870 teaches that the first set of alkalines comprises NH<sub>4</sub>OH [page 2, paragraph 15]. '870 does not explicitly



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disclose the concentration of the first set of acids in the third solution, but it does teach on page 2, paragraph 15 that the relative amounts of  $\text{NH}_4\text{OH}$  may be determined routinely by one of ordinary skill in the art without undue experimentation. It would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the concentration of the solution, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Claims 50-53: '870, '049, and '393 teach the limitations of claim 2 above. '870 teaches that the fifth solution comprises  $\text{H}_2\text{O}_2$  [page 2, paragraph 15]. '870 does not explicitly disclose the concentration of the first set of acids in the third solution, but it does teach on page 2, paragraph 15 that the relative amounts of  $\text{H}_2\text{O}_2$  may be determined routinely by one of ordinary skill in the art without undue experimentation. It would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the concentration of the solution, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over '870, '049, and '393 as applied to claim 2 above, and further in view of Suzuki et al. (U.S. Patent 4,688,918, hereafter '918).

Claim 8: '870, '049, and '393 teach the limitations of claim 2 above. They do not explicitly teach exposing the set of structures in a second solution for a second period where the set of structures are rinsed and mechanically rubbed with an alcohol. However, '918 teaches that

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rinsing a solution with an alcohol following a ketone is known [col. 5, lines 41-43]. It would have been obvious to a person of ordinary skill in the art to rinse the structures with alcohol in an attempt to provide an improved cleaning method, as a person with ordinary skill has good reason to pursue the known options within his or her technical grasp. In turn, because rinsing with an alcohol following a ketone as claimed has the properties predicted by the prior art, it would have been obvious to use that method of cleaning. As discussed in claim 1 above, scrubbing or wiping or rubbing surfaces during wet cleaning is conventionally utilized in the art, as indicated by '393, who teaches cleaning the surfaces of substrates with a brush [i.e. scrubbing] [page 1, paragraphs 4-5]. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the cleaning techniques taught by '393 in combination with the solutions taught by '870 with a reasonable expectation of success because '393 teaches that brushes are an effective way to remove any residual debris on the substrate.

6. Claims 40-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over '870, '049, and '393 as applied to claim 2 above, and further in view of Amai et al. (U.S. Patent 7,063,094, hereafter '094).

Claims 40-43: '870, '049, and '393 teach the limitations of claim 2 above. '870 teaches the use of  $\text{HNO}_3$  in the second set of acids. It remains silent about the use of  $\text{CH}_3\text{COOH}$  in the second set of acids. '094 teaches that foreign substances on the interior surfaces of the chamber can be dissolved by nitric or acetic acid, thus recognizing the equivalency between nitric and acetic acid for similar purposes. However, substitution of equivalent methods requires no express motivation, as long as the prior art recognizes equivalency. *In re Fount*, 213 USPQ 532 (CCPA 1982); *In re Siebentritt*, 152 USPQ 618 (CCPA 1967); *Graver Tank & Mfg. Co. Inc. V.*

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*Linde Air Products Co.*, 85 USPQ 328 (USSC 1950). '870 does not explicitly disclose the concentration of the second set of acids, but it does teach on page 2, paragraph 16 that the relative amounts of HNO<sub>3</sub> may be determined routinely by one of ordinary skill in the art without undue experimentation. As '094 taught the equivalency between nitric and acetic acid, it would have been obvious to optimize the concentrations of acetic acid instead of the nitric acid. It would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the concentration of the solution, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

#### ***Double Patenting***

7. Applicant is advised that should claim 21 be found allowable, claim 22 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

#### ***Response to Arguments***

8. Applicant's arguments filed October 2, 2007 have been fully considered but they are not persuasive. In response to Applicants' argument regarding the cleaning time while rubbing, '870 teaches that the time the structures remain in contact with the cleaning solution is a result effective variable. It is common knowledge that brushing a structure while using a cleaning solution decreases the time required to clean the object. Therefore, it would have been obvious

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to one having ordinary skill in the art at the time the invention was made to optimize the cleaning time of brushing the structures with the cleaning solution, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

### ***Conclusion***

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patents: Collins et al. (6,814,814). U.S. PGPubs: Oya et al. (2002/0115024), Welsh et al. (2003/0000034).


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicole Blan whose telephone number is 571-270-1838. The examiner can normally be reached on Monday - Thursday 8-5 and alternating Fridays 8-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NRB



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PATENT EXAMINER